

What is claimed is:

1. A soft input soft output (SISO) decoder for use in a hardware based turbo code decoder for receiving a sequence of samples representing a series of transmitted codewords selected from a known set of codewords, the SISO decoder comprising:
  - a metric aggregator for receiving and manipulating branch and state metric pairs, the branch and state metric pairs being related to the sequence of samples; and
  - a codeword resolver for resolving the manipulated branch and state metrics pairs to a codeword in the set, in accordance with an un-normalized likelihood relationship between the received branch and state metrics pairs and the known set of codewords.
2. The turbo decoder of claim 1 wherein the metric aggregator includes a plurality of D-type flip-flops and a plurality of adders, each D-type flip-flop of the plurality of D-type flip-flops for receiving one of the branch or state metrics in each pair, and each adder for receiving related branch and state metrics from an associated D-type flip-flop.
3. The turbo decoder of claim 2 wherein the D-type flip-flops are 8 bits in length.
4. The turbo decoder of claim 2 wherein the adders add 6 bit and 8 bit values.
5. The turbo decoder of claim 1 wherein the codeword resolver includes a hybrid architecture for state-metric calculation.
6. The turbo decoder of claim 1 wherein the codeword resolver includes two MIN\* modules at a first level for receiving data associated with aggregated branch and state metrics, the outputs of two MIN\* modules being provided to a third MIN\* module.
7. The turbo decoder of claim 1 wherein the codeword resolver includes two MIN modules at a first level for receiving data associated with aggregated branch and state metrics, the outputs of two MIN modules being provided to a MIN\* module.

8. The turbo decoder of claim 1 wherein the codeword resolver includes two MIN modules at a first level for receiving data associated with aggregated branch and state metrics, the outputs of two MIN modules being provided to a MIN\* module, the MIN\* module having a subtractor, a multiplexer controller, and a control module for performing correction operations in accordance with control signals received from the multiplexer controller.

9. The turbo decoder of claim 1 wherein the likelihood relationship is a likelihood that a particular un-normalized distance from the manipulated branch and state metrics pairs to the codeword, when compared to un-normalized distances to other codewords, indicates that the codeword is correct.

10. A MIN\* operator for use in a soft input soft output (SISO) decoder associated with a turbo decoder, comprising:

a subtractor for receiving data to be decoded, the data associated with aggregated branch and state metrics;

a correction module for performing correction operations on data received from the subtractor, the correction module including a pair of lookup tables, and a plurality of multiplexers; and

a multiplexer controller for controlling operation of the plurality of multiplexers in the correction module to effect the correction operations in accordance with control signals generated by the multiplexer controller.

11. The MIN\* operator of claim 10 wherein the pair of lookup tables includes a positive value lookup table and a negative value lookup table.

12. The MIN\* operator of claim 10 wherein each of the pair of lookup tables has 4 entries.

13. The MIN\* operator of claim 10 wherein the multiplexer controller includes a plurality of control units.

14. The MIN\* operator of claim 13 the plurality of control units in the multiplexer controller is equal to the plurality of multiplexers in the correction module.

15. A method of soft input soft output decoding for resolving a sequence of samples to a codeword in a known set of codewords, the method comprising:

receiving a plurality of branch metric and state metric pairs related to the sequence of samples;

aggregating related branch and state metric pairs; and

resolving the aggregated branch and state metric pairs to the codeword in the set in accordance with an un-normalized likelihood relationship between the aggregated branch and state metrics pairs and the known set of codewords.

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